



eClassroom

GCSE MATHEMATICS • ALGEBRA

Simplifying & Expanding

Worked Solutions

Pearson Edexcel GCSE (1MA1) & International GCSE (4MA1) • No calculator

Full worked solutions for the free Simplifying and Expanding worksheet, GCSE and iGCSE Maths



Tap a section to jump straight to it

Full worked solutions for every question on the Simplifying & Expanding worksheet, in the same order and with the same question numbers.

How to mark your work. Tick each step you got right, not just the final answer. In the exam, method marks are given for correct working even when the final answer is wrong. If you lost marks, find the *first* line where your working is different from ours. That is the thing to fix.

In Section E: **M** = method mark, **P** = process mark, **A** = accuracy mark, **B** = independent mark, **C** = communication mark.

Question sheet

Algebra revision engine

Free courses

More worksheets



Join students already acing their exams.

Book your FREE lesson at www.eclassroom.org.uk

A**Your turn answers**

Compare each line of your working with the solution.

FOUNDATION

A1 ba is the same as ab : $4ab + ab = 5ab$ $-2a + 5a = 3a$ $5ab + 3a$

A2 $6y - 6 - 2y - 6 = 4y - 12$

A3 $x^2 - 2x - 5x + 10 = x^2 - 7x + 10$ $-5 \times -2 = +10$

HIGHER

A4 $4x^2 - 12x + x - 3 = 4x^2 - 11x - 3$

A5 $(3x + 2)(3x + 2) = 9x^2 + 6x + 6x + 4 = 9x^2 + 12x + 4$

A6 $(x - 3)(x + 2) = x^2 - x - 6$ $(x^2 - x - 6)(x + 5) = x^3 + 5x^2 - x^2 - 5x - 6x - 30 = x^3 + 4x^2 - 11x - 30$

A7 $(2x + a)^2 = 4x^2 + 4ax + a^2$ $a^2 = 9$ and $a > 0$, so $a = 3$ $b = 4a = 12$

B**Fluency solutions**

One mark for each correct part. The notes in *italics* explain why each sequence was chosen.

FOUNDATION

B1 (a) $8a$ (b) **cannot be simplified** (c) **cannot be simplified** (d) $8ab$

a^2 and a are unlike terms. ab and ba are like terms.

B2 (a) $4x + 3y$ (b) $4x^2 - 3x$ (c) $3p - 3$ (d) $5xy + x^2$

B3 (a) $4x + 12$ (b) $-4x - 12$ (c) $-4x + 12$ (d) $x^2 - 3x$ *Negative times negative is positive.*



B4 (a) $5x + 13$ (b) $2x + 10 - 3x - 3 = -x + 7$ (c) $2x + 10 - 3x + 3 = -x + 13$ (d) $x^2 + 2x - 3$

B5 (a) $x^2 + 7x + 10$ (b) $x^2 - 3x - 10$ (c) $x^2 - 7x + 10$ (d) $x^2 + 3x - 10$

The number term is the product of the two numbers; the x term comes from their sum.

B6 (a) $x^2 + 12x + 36$ (b) $x^2 - 12x + 36$ (c) $x^2 - 36$

A square has two equal middle terms. In (c) the middle terms cancel: the difference of two squares.

HIGHER

B7 (a) $2x^2 + 7x + 3$ (b) $6x^2 + 5x + 1$ (c) $6x^2 + 8x - 3x - 4 = 6x^2 + 5x - 4$ (d) $15 - x - 2x^2$

B8 (a) $9x^2 - 6x + 1$ (b) $x^2 + x + \frac{1}{4}$ (c) $4x^2 + 12xy + 9y^2$ (d) $16x^2 - 25$

B9 (a) $x^3 + 6x^2 + 11x + 6$ (b) $(x^2 - 1)(x + 2) = x^3 + 2x^2 - x - 2$ (c) $x^3 + 6x^2 + 12x + 8$
 (d) $(2x^2 + x - 1)(x - 3) = 2x^3 - 5x^2 - 4x + 3$

B10 (a) $2a = 10$: $a = 5$ (b) $2a = 10$: $a = 5, b = 25$ (c) $a = 2$, $b = 1 - 6 = -5$ (d) $a^2 = 49$: $a = 7$

C

Reasoning solutions

Your wording can be different. Check that your reason makes the same point.

FOUNDATION

C1 Jay only squared each term. $(x + 3)(x + 3)$ also has two middle terms, $3x$ and $3x$ $x^2 + 6x + 9$

C2 Mia multiplied -2 by -4 and got -8 , but negative times negative is positive. $-2x + 8$

C3 (a) $3x$ and $2y$ are unlike terms, so they cannot be added into one term. (b) $6xy$

C4 $(x + 5)(x - 1) = x^2 + 4x - 5$ $(x + 2)^2 = x^2 + 4x + 4$
 $x^2 + 4x - 5 - x^2 - 4x - 4 = -9$, which does not depend on x , as required



HIGHER

C5 $(a+b)^2 = a^2 + 2ab + b^2$, so it equals $a^2 + b^2$ only when $2ab = 0$, which is when $a = 0$ or $b = 0$. Otherwise it is not equal.

C6 (a) $(100+3)(100-3) = 10000 - 9 = 9991$ (b) $(100+1)^2 - (100-1)^2 = 10201 - 9801 = 400$

C7 When $x = 1$: $(1+2)^3 = 27$ but $1+8 = 9$, so Leo is wrong. $(x+2)^3 = x^3 + 6x^2 + 12x + 8$

C8 (a) $(2n+1)^2 - (2n-1)^2 = (4n^2 + 4n + 1) - (4n^2 - 4n + 1) = 8n$
 (b) $8n = 8 \times n$, and n is a whole number, so the difference is a multiple of 8
 Check: $17^2 - 15^2 = 289 - 225 = 64 = 8 \times 8$

D

Problem solving solutions

There is often more than one correct method. Any complete, correct method scores full marks.

FOUNDATION

D1 Floor: $(x+4)(x+1) = x^2 + 5x + 4$ Rug: $2x$ Uncovered: $x^2 + 3x + 4$ m²

D2 Middle bricks: $3x - 2$ and $5x - 3$
 (a) $8x - 5$ (b) $8x - 5 = 27$, so $8x = 32$ and $x = 4$

D3 $\frac{4(n+3) - 2n}{2} = \frac{4n+12-2n}{2} = \frac{2n+12}{2} = n+6$ 6 more than n , as required

D4 $(x+a)(x-2) = x^2 + (a-2)x - 2a$ $a-2 = 3$, so $a = 5$ and $2a = 10$ $(x+5)(x-2) = x^2 + 3x - 10$

HIGHER

D5 (a) $(x+1)(x-1) = x^2 - 1$ $(x^2 - 1)(x+2) = x^3 + 2x^2 - x - 2$ as required
 (b) $64 + 32 - 4 - 2 = 90$, and $5 \times 6 \times 3 = 90$ Both give 90

D6 Square: $4x^2 + 12x + 9$ Rectangle: $4x^2 + 9x + 5$ Difference: $3x + 4$
 $3x + 4 = 19$, so $x = 5$



D7 (a) $n(n+1) = n^2 + n$ and $(n-1)(n+2) = n^2 + n - 2$, so the difference is always 2

as required

(b) $7 \times 8 = 56$ and $6 \times 9 = 54$ $56 - 54 = 2$

D8 $(ax+b)^2 - (x+c)^2 = (a^2-1)x^2 + (2ab-2c)x + (b^2-c^2)$

$a^2 - 1 = 8$, so $a = 3$ $b^2 - c^2 = -3$, so $(b-c)(b+c) = -3$, giving $b-c = -1$ and $b+c = 3$

So $b = 1$ and $c = 2$. Check the x term: $2 \times 3 \times 1 - 2 \times 2 = 2$

$a = 3$, $b = 1$, $c = 2$

E

Exam practice solutions

Marks are shown on the right of each line.

FOUNDATION

Foundation and Higher crossover

E1 (a) $3a + 4b$

B1

(b) $3x^2 - 2x$

B1

(c) $5ab$

B1

E2 (a) $6y - 15$

B1

(b) $3x + 12 - 2x + 10$

M1

$x + 22$

A1

E3 $x^2 - 3x + 5x - 15$

M1

$x^2 + 2x - 15$

A1

E4 $x^2 - 4x - 4x + 16$

M1

$x^2 - 8x + 16$

A1

E5 Rectangle: $(x+7)(x+2) = x^2 + 9x + 14$

M1

Subtract the square: $x^2 + 9x + 14 - x^2$

M1

$= 9x + 14$

as required

A1

E6 (a) $10xy$

B1

(b) $x^2 - 6x$

B1

(c) $3x^2 + 6x - x^2 + 4x = 2x^2 + 10x$

B1



Join students already acing their exams.

Book your FREE lesson at www.eclassroom.org.uk

HIGHER

E7	$(x+2)(x-1) = x^2 + x - 2$ $(x^2 + x - 2)(x+3) = x^3 + 3x^2 + x^2 + 3x - 2x - 6$ $x^3 + 4x^2 + x - 6$	M1 M1 A1
E8	$(2x-3)^2 = 4x^2 - 12x + 9$ $(x-3)^2 = x^2 - 6x + 9$ $4x^2 - 12x + 9 - x^2 + 6x - 9 = 3x^2 - 6x$ $= 3x(x-2)$ as required	M1 M1 A1
E9	$3x^2 - 6x + ax - 2a$ $-2a = -8$, so $a = 4$ $b = a - 6 = -2$	M1 A1 A1
E10	(a) Pair the outer and inner brackets: $n(n+3) = n^2 + 3n$ and $(n+1)(n+2) = n^2 + 3n + 2$ Let $m = n^2 + 3n$: LHS = $m(m+2) + 1 = m^2 + 2m + 1$ $= (m+1)^2$ $= (n^2 + 3n + 1)^2$ as required (b) $n = 7$: $49 + 21 + 1 = 71$ 71^2	M1 M1 M1 A1 B1

